



Geo_12 - Journey to School

Subject Area

Geography

Suggested Level

Years 7–9

1. Key Statistical Literacy Competencies

- Data awareness
- The ability to understand statistical concepts
- The ability to analyse and interpret and evaluate statistical information
- Communicating statistical information and understandings

Overview

Everything on the earth's surface has a location that may be identified by just two coordinates, namely latitude and longitude. One of the growing trends is to provide a location for just about everything and the increasing use of portable devices will make this ever easier. This activity investigates the location of students and their journey to school. Its purpose is to integrate a range of technologies from Google Earth, MS Excel, a geographic information system (if available), with the engaging online learning tool CensusAtSchool and census data.

The activity begins with each student investigating their location and their own journey to school. Their data is amalgamated with class data and comparisons are made with Australian students through the use of the online resource, CensusAtSchool, produced by the Australian Bureau of Statistics. The activity may be extended by integrating census data about journey to work. The geographic concepts of location, scale, distance, distribution and movement are highlighted and the activity could be extended into the development of a sustainable school transport plan.

Requirements

- Computer
- Internet connection
- Spreadsheet software program
- Calculator (optional)
- Pens, paper and tracing paper (optional)



- GIS software (optional)

Instructions

Where do I live and how do I travel to school?

The activity begins with each student identifying their home location (using latitude and longitude) and details about their journey to school. For privacy reasons, the nearest road junction may be a preferred location to use.

Latitude and longitude may be expressed in degrees, minutes and seconds and also as decimal degrees. Google Earth provides both formats. Use the Preferences menu to set the units in Google Earth or download the 'maplet' in Google Maps. (Location expressed as decimal degrees is only required if transferring the information to geographic information system software).

Over a period of one week prior to coming to class, ask students to record how they came to school and the time each trip took. From this data ask them to determine their most common method of transport to and from school and their average journey time for that method of transport.

Using one of the following Google Earth, Google Maps or web based satellite images such as those at www.flashearth.com/

1. Ask students to identify their home location in latitude and longitude (as degrees, minutes and seconds) and as decimal degrees (if transferring to a geographic information system software)
2. Their most common method of transport to school
3. The journey time for that method of transport.

They should record their information in a table similar to Table 1.

TABLE 1 SAMPLE DATA COLLECTION FOR AN INDIVIDUAL STUDENT							
Student	Latitude of home (Using °, ', ")	Longitude of home (Using °, ', ")	Latitude as decimal	Longitude as decimal	Method	Distance (kms)	Time (min)
Peter	-37° 57' 14.11" S	145° 2' 2.23" E	-37.953919°	145.033952°	Cycle	4.3	16

4. In pairs ask students to explain how latitude and longitude shown as decimal degrees relates to latitude and longitude shown as degrees minutes and seconds.

Where do my classmates live and how do they travel to school?

The purpose of this section is to amalgamate the data for individual students into a class spreadsheet (Table 2). The whole class data may be analysed and in

conjunction with a map to show the distribution of students, discussion of ways to reduce the ecological footprint or carbon footprint of the group may be undertaken.

Ask students to add their own data to a summary spreadsheet for the whole class. Build a table similar to Table 2.

Compiling the class data

TABLE 2. EXAMPLE OF A CLASS DATA COLLECTION SPREADSHEET							
Student	Latitude (Using °, ', ")	Longitude (Using °, ', ")	Latitude as decimal	Longitude as decimal	Method	Distance	Time
Peter	-37° 57' 14.11" S	145° 2' 2.23" E	- 37.953919°	145.033952°	cycle	4.3	16
Mary	-37° 54' 23.00" S	144° 59' 43.67"E	- 37.906389°	144.995465°	cycle	3.4	9
Ahmed	-37° 56' 10.10" S	145°30' 49.99"E	- 37.936139°	145.513886°	bus	6	25
Juliana	-37° 55' 30.47"S	145° 0' 44.15"E	- 37.925131°	145.012264°	walk	1	8

Analysing the class data

Ask students to complete the following questions:

- From a study of the latitude and longitude values provided for the whole class, identify
 - The students who live furthest to the north, south, east and west.
 - Students who live closest together.
- What is the most common method of travel to school for the class?
- Brainstorm the factors that affect the journey time to school?
- Calculate the (i) mean and (ii) median journey time for the class. Which is the best measure for representing journey time?
- Calculate the (i) mean and (ii) median journey time for each method of transport. Comment on your findings.
- Identify the positive and negative aspects of each method of transport used by the class.
- Create a scatter plot with distance on the 'x' axis and time taken on the 'y' axis. What relationship exists between these two variables? How do different methods of transport affect this relationship?

Mapping the class data

This action could be developed by individuals, groups of students or alternatively by the teacher. Use the class data to create a map to show where students live. This may be completed as placemarks in Google Earth, by importing the student's



location information into a geographic information system (GIS), or with a base map, tracing paper and coloured pencils. Use different colours or symbols for each method of transport. The end result will show the distribution of students and their method of transport.

1. Describe the distribution of students in the class.
2. Choose one form of transport used by the students and describe the distribution of students who use this method to travel to school. How is it different to the pattern for the whole class?
3. Complete the following sentences based upon the distribution of students in the class and data calculated.
 - Students who walk.....
 - Car travel
 - The distribution of.....
 - The students who travel furthest
 - It is faster to come by than.....

How could my class reduce its carbon footprint?

Introduce the concept of a 'carbon footprint' or 'ecological footprint' and discuss the role of different forms of transport. A website such as [Carbon Neutral](#) enables emissions to be calculated.

1. Ask each student to calculate the total distance travelled to and from school each week. Use this value and the 'Carbon Neutral calculator' to estimate the emissions created by their travel to school each week using their most common method of transport.
2. Calculate the total weekly emissions for the class and ask students to discuss how they could reduce this total.
3. Complete one of the following activities
 - a) Design a competition between groups or classes to reduce carbon emissions created by the journey to and from school.
 - b) Ask students to complete a primary research project to investigate how emissions created by primary school students differ from secondary students.
 - c) Write a letter to the Principal to outline your proposals for the development of a sustainable transport plan for your school.

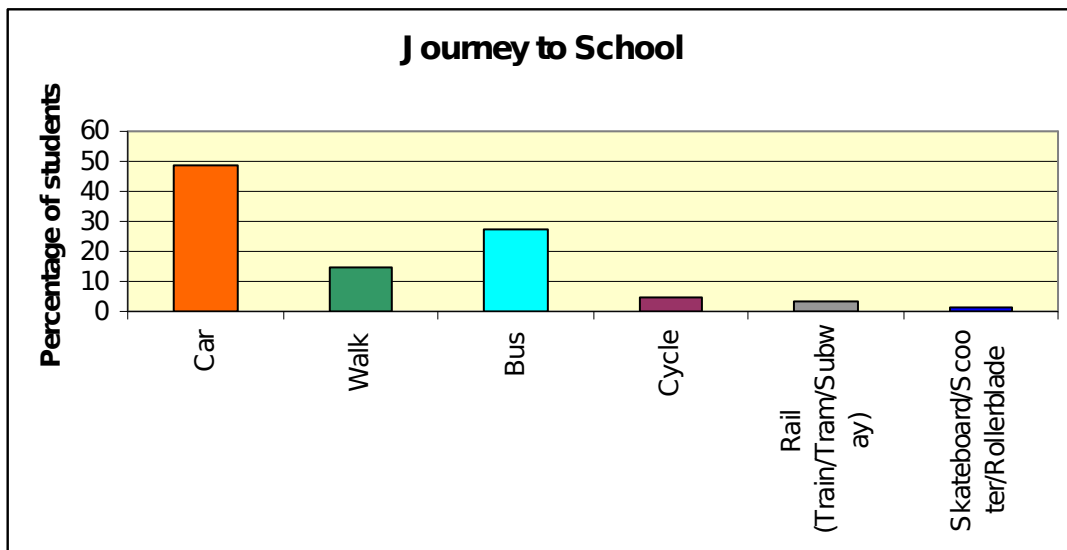
How do Australian students travel to school?

The best way to answer this question would be to ask every student in Australia, but this is impossible. Taking a survey of students is a way of finding out. CensusAtSchool has the responses from over 44,000 students.

1. Ask students to take a random sample of 200 students (<http://www.cas.abs.gov.au/cgi-local/cassampler.pl>) from this database. [Prepared samples](#) are also available from the CensusAtSchool website, if access to the computer is difficult.
2. Students should extract the relevant data about journey to school e.g. the sex and year level of the students, the method of travel to school and the journey time. Using the 'Countif' function, ask students to create a graph to show how their sample of Australian students travels to school. Figure 1 shows a graph created from a random sample of Australian students created using CensusAtSchool data.

Details on how to use this and other simple Excel functions are found the [Professional Development video tutorials](#) for the CensusAtSchool resource.

FIGURE 1: EXAMPLE OF GRAPH TO SHOW JOURNEY TO SCHOOL, RANDOM SAMPLE OF 200 STUDENTS, CENSUSATSCHOOL 2008.



3. From the sample generated calculate the
 - (i) mean and (ii) median journey time for the sample of Australian students.
 - (i) mean and (ii) median journey time for each type of transport.
4. Create a table to compare the class data with the sample of Australian students from the CensusAtSchool database and comment on the similarities and differences observed.

Extension

How do different populations of Australian students travel to school?

Ask students to investigate how the pattern of travel changes for different populations of students. Divide the class into 6 groups and ask each group to take



one of the following random samples (a-f) from the CensusAtSchool database and create a graph to show the percentage of students who use each method of transport to school.

Ask students to compare their results and explain the variations identified.

- a) Sample of girls only
- b) Sample of boys only
- c) Sample of younger students (Years 4-8)
- d) Sample of older students (Years 9-12)
- e) A sample from two different Australian states.
- f) A sample of 25 students and one of 150 students.

How do people in my neighbourhood travel to work?

Investigate how Australian's travel to work by using 2006 Census data, from www.abs.gov.au/census . Click on 'Census Data Online' from the left-hand navigation menu.

Data is provided for Australia (Table 3 below). However, data may be acquired for your local area by selecting the product 'Census Tables'. Use the topic 'Transport access and use' and the table 'Method of travel to work by sex' simplify the spreadsheet to one form of transport only for persons, rather than males and females.

1. Use the data selected to create a graph to show how people in either Australia or your local area travelled to work on Census day.
2. Compare the results from this graph with that of how the class travelled to school.

TABLE 3: 2006 CENSUS OF POPULATION AND HOUSING (AUSTRALIA): METHOD OF TRAVEL TO WORK (ONE METHOD ONLY)	
One method only:	Persons
Train	305,197
Bus	250,723
Ferry	9,844
Tram (includes light rail)	35,935
Taxi	21,972
Car, as driver	5,404,031
Car, as passenger	533,320
Truck	120,404
Motorbike/scooter	60,778



Bicycle	90,115
Other	53,866
Walked only	367,166
Total one method	7,253,351

Source: 2006, Census of Population and Housing cat.no. 2068.0 - 2006 Census Tables

3. Discuss ways to encourage the Australian population to reduce its transport carbon footprint

Glossary

Sustainable development: economic development designed to meet present needs while also taking into account future costs, including costs to the environment and depletion of natural resources.

Ecological footprint: a measure of the demands put on the environment by humans, taking into account the emissions produced in the production of food and in goods and services, as well as those produced in fuel consumption and household requirements such as heating, cooling, etc.

Carbon footprint: the carbon dioxide emissions for which an individual or organisation can be held responsible, as by their travel, fuel consumption, diet, energy requirements, etc.

References

(Note: Links to ABS publications are to the most recent release. Previous releases can be accessed by selecting the 'Past & Future Releases' tab.)

Australian Bureau of statistics provides free digital maps on its website www.abs.gov.au. You can use the Google search box to find the following catalogues:

FREE Digital boundaries: Catalogue nos. 1259.0.30.002, 2923.0.30.001 and 1259.0.30.001 (click on 'Downloads' tab). Unzip and import into MapInfo or ArcGIS 9.

Carbon Neutral available world wide web (April2009), <http://www.carbonneutral.com.au/calc/>

CensusAtSchool, <http://www.abs.gov.au/censusatschool>

Census Datapacks (CD Rom product): Available for purchase (\$115) includes digital boundaries (Mif and shape file) and 45 tables of key Census characteristics for persons, families and dwellings, covering Australia from Collection district level and above.



Feedback

To provide any feedback regarding this activity, please contact ABS Education Services on 1800 623 273 or email education@abs.gov.au.